

COURSE IMPLEMENTATION DATE: May 1994  
 COURSE REVISED IMPLEMENTATION DATE: January 2010  
 COURSE TO BE REVIEWED: October 2013  
 (Four years after UPAC final approval date) (MONTH YEAR)

**OFFICIAL COURSE OUTLINE INFORMATION**

Students are advised to keep course outlines in personal files for future use.  
 Shaded headings are subject to change at the discretion of the department and the material will vary - see course syllabus available from instructor

FACULTY/DEPARTMENT:	Faculty of Science, Health & Human Services/ Physics	
PHYS 362	PHYS 462	3
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS
	<b>Digital Electronics and Computer Interfacing</b>	
COURSE DESCRIPTIVE TITLE		

**CALENDAR DESCRIPTION:**

This course emphasizes elementary digital electronics and interfaces. Topics include gates and Boolean algebra, Karnaugh maps, flip flops, registers, counters and memories, digital components, microprocessor functions and architecture, instruction sets, D/A and A/D converters, and waveshaping. PHYS 372, the laboratory portion of this course, must be taken concurrently. This course is designed to provide practical experience with the basic digital logic chips and how digital circuits can be interfaced with microprocessors.

Note: Students with credit for PHYS 462 cannot take this course for further credit.

PREREQUISITES: **PHYS 222**  
 COREQUISITES:  
 PRE or CO-REQUISITES: **PHYS 372**

SYNONYMOUS COURSE(S)	<b>SERVICE COURSE TO:</b>
(a) Replaces: <b>PHYS 462</b> (Course #)	(Department/Program)
(b) Cannot take: <b>n/a</b> for further credit. (Course #)	(Department/Program)

TOTAL HOURS PER TERM:	<b>75</b>	TRAINING DAY-BASED INSTRUCTION
<b>STRUCTURE OF HOURS:</b>		LENGTH OF COURSE:
Lectures:	<b>75</b> Hrs	HOURS PER DAY:
Seminar:	Hrs	
Laboratory:	Hrs	
Field Experience:	Hrs	
Student Directed Learning:	Hrs	
Other (Specify):	Hrs	

MAXIMUM ENROLLMENT:	<b>24</b>
EXPECTED FREQUENCY OF COURSE OFFERINGS:	<b>Once every 2 or 3 years</b>
<b>WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only)</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department)</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE:</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No

**AUTHORIZATION SIGNATURES:**

Course Designer(s):	George McGuire; revised P. Mulhern	Chairperson:	Gillian Mimmack ( <i>Curriculum Committee</i> )
Department Head:	Norm Taylor	Dean:	<b>September 1, 2009</b> Jackie Snodgrass
UPAC Approval in Principle Date:	May 22, 2009	UPAC Final Approval Date:	October 2, 2009

**LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:**

This course is designed to provide students with:

1. the theory needed to understand the purpose and how digital devices function;
2. an understanding and an appreciation of how a digital computer functions;
3. the ability to design, construct and test simple digital logic circuits;
4. an ability to program the common microprocessors;
5. how information can be transferred to and from computers.

**METHODS:**

This course will be presented using lectures, demonstrations, experiments, and computer simulations. Computer simulations will be used to design and to check the digital logic circuits. The laboratory portion of the course will provide the actual experience and the practice needed to confirm the digital logic theory studied in the lecture portion of the course. This unique combination of classroom theory, computer simulation, and practical experience should provide the students with the necessary knowledge and experience to design circuits to perform specific tasks. Students after successfully completing this course will have a good understanding of basic digital electronics, microprocessors, computer architecture, computer interfacing, and computers can be used to model and test circuits.

**PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):**

Credit can be awarded for this course through PLAR (Please check:)  Yes  No

**METHODS OF OBTAINING PLAR:**

Please see the Physics PLAR policy on the department's webpage

**TEXTBOOKS, REFERENCES, MATERIALS:**

[Textbook selection varies by instructor. An example of texts for this course might be:]

TEXTS: Roden and Carpenter, Electronic Design, Discovery Press (1997)  
Palmer and Perlman, Introduction to Digital Systems, McGraw Hill (1993)  
Borgart, Introduction to Digital Circuits (1992)

**REFERENCES:**

1. Horowitz and Hill, The Art of Electronics, Cambridge, 1989
2. Simpson, R., Introductory Electronics for Scientists and Engineers, 2<sup>nd</sup> Ed., Simon & Schuster, 1987
3. Driscoll, F., Analysis of Electric Circuits, Prentice Hall, 1973
4. Fortney, L., Principles of Electronics, HBJ, 1987
5. Bogart Jr, T.F. Introduction to Digital Circuits

**STUDENT EVALUATION:**

[An example of student evaluation for this course might be:]

Assignments	25%
Mid-term	25%
Final	50%

**COURSE CONTENT:**

[Course content varies by instructor. An example of course content might be:]

(Chapters refer to Bogart)

Introduction; Digital vs. Analog; Elements of Design  
Chap 3: Logic Gates  
Chap 4: Boolean Algebra  
Chap 4: Karnaugh Maps; Chap 5: Practical Considerations  
Chap 6: Pulse and Digital Circuits  
Physics of semiconductors; Analog – diodes  
Analog – transistors and op-amps  
Chap 7: Waveshaping and Waveform Analysis  
Appendix 1: Spice

Chap 7: Comparators and Schmitt Triggers; Sensors  
Chap 8: Multivibrators and 555 Clock  
Chap 9: Basics of Internal Gate Structure  
Chap 10: Logic Families  
Chap 11: RS and D Flip-Flops  
Chap 11: JK Flip-Flops and applications: bus structure  
Chap 12: Registers; Chap 15 Multiplexers  
Chap 13: Encoders and Decoders  
Chap 2: Binary and Hexadecimal  
Chap 14: Counters – Asynchronous  
Chap 14: Counters – Synchronous  
Midterm: Chapters 3 – 11  
Chap 15: Adders  
Chap 12: Registers: Logical Comparators  
Computers: Turing machine, Von Neuman cycle, architecture  
Virtual Machines: Bus Architecture  
Chap 16: Memories  
Chap 17: D/A  
Chap 17: A/D and other interfacing  
Game Port; Software interrupts  
RS – 232 Interface  
IEEE – 488 Interface  
PLA and 8253/8255 chips  
Mechanical Interfaces; Stepper Motors